

Polynesian-South America Round Trip Canoe Voyages

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The well-documented cultivation of the sweet potato in East Polynesia, plus the much more arguable pre-European presence in Polynesia of other cultigens as well as some artifacts and human genes from South America, has been explained by various authorities as either the result of one-way raft voyages by South American sailors to Polynesia, or of two-way canoe voyages by Polynesian sailors to South America and return. Although the simplicity of imagining a raft voyage from South America to Polynesia is appealing, we should not dismiss the possibility that some particularly daring Polynesian sailors might have made a round-trip voyage. In the last issue of this journal, George Gill (1994) proposed a round-trip between Polynesia and South America that probably started in the Marquesas and ended up at Rapa Nui as one of three scenarios that would be consistent with his osteological findings of an apparent mixture of Polynesian and South American features on Rapa Nui. Based on my own thoughts on sailing to South America and back contained in an article now in press in the Japanese journal *Man and Culture in Oceania* (Finney in press), I would like to offer some comments on Gill's suggestion.

If ever a Polynesian canoe reached South America, and provided the crew was able to refit it and lay in sufficient stores, a return voyage would have been more than just possible, for voyaging canoes excel at sailing with the wind--in this case the southeast trades--blowing abaft abeam. It is the voyage from Polynesia to South America that appears to present a much greater challenge. That is because it looks like a canoe would have to beat for some four thousand of miles from the Marquesas, Tuamotu-Gambiers, or Australs, or at least the 2300 miles from Rapa Nui, against steady trades and accompanying currents to reach the continent. Scenarios featuring canoes beating to windward are most unrealistic, given the trigonometry of windward sailing. A double canoe that can make good about 75° to windward would have to tack back and forth over almost four miles of ocean to make one mile directly upwind, a ratio that increases markedly when sailing against a current, such as that which usually accompanies the trades (Finney 1985). In this light, the direct sail from the Marquesas to South America pictured in the end paper of Buck's *Vikings of the Sunrise* (see Figure 1, route A) seems highly implausible.

Sailors in the age of the square-riggers recognized this problem, and avoided trying to beat windward against the trades. In the nineteenth century sailing manuals, for example, the recommended route from the Marquesas to Valparaiso takes a ship on a roundabout course south out of the trade wind belt and into the higher latitudes where westerlies prevail, and then east to run directly to the coast of Chile before these westerlies (Labrosse 1874, Figure 1, route B). However, the eastbound leg of such a route would have

exposed Polynesian voyagers sailing in open canoes to the cold, rough seas of the higher latitudes which could easily have broken up their vessels, or simply killed them through hypothermia. Departing from Rapa Nui would, of course, greatly shorten such a voyage and therefore lessen the dangers to crew and canoe (Figure 1, route C).

Fortunately, Polynesian voyagers who had reached the edge of their island world and wanted to probe the apparently island-less seas to the east had a number of warm water alternatives to dipping down into the higher latitudes to find westerly winds. In the long migration from the Asian side of the Pacific to the mid-ocean islands of Polynesia their ancestors had learned how to exploit westerly wind shifts to sail to the east. Each summer spells of westerly winds periodically interrupt the easterly trade winds, particularly in the western Pacific. The regular seasonal dominance of these westerlies in the seas between New Guinea and Fiji, Tonga, and Samoa may help to explain why pioneering Lapita voyagers were able to move so swiftly from the Bismarck Archipelago to the edge of Polynesia. Although these summer westerlies become more episodic the farther east one sails across Polynesia, they were probably critical to continued eastward migration from Samoa and Tonga to the archipelagos of central east Polynesia. Certainly, historical accounts, including one penned by Captain Cook, indicate that Tahitians and other eastern Polynesians waited for the winds whenever they wanted to sail to the east. Given, however, the great ocean gap between the archipelagos of central East Polynesia and Rapa Nui, one wonders whether the settlers of Rapa Nui had been able to exploit episodes of these summer westerlies to sail all the way to this easternmost Polynesian island.

There are at least two other westerly wind regimes that might have been used by adventurous voyagers to sail to Rapa Nui or perhaps even to South America (Finney 1993). During major El Niño conditions the normal atmospheric pressure gradient (high over Rapa Nui and low over Indonesia) basic to easterly trade wind flow reverses (low over Rapa Nui and high over Indonesia) weakening the trades and bringing outbreaks of strong westerlies that reach far across the Pacific. During the last major El Niño, that of 1982-1983, the weather station at Rapa Nui recorded frequent westerly winds (Caviades and Wayland 1993), suggesting that under such conditions a canoe could have sailed directly from the Marquesas to Rapa Nui. Furthermore, since these El Niño westerlies probably spread much farther to the east than Rapa Nui, perhaps some time in the past a similarly massive outbreak of such winds might have enabled a group of Marquesans or other East Polynesians to sail directly to South America.

East Polynesians living farther to the south might have

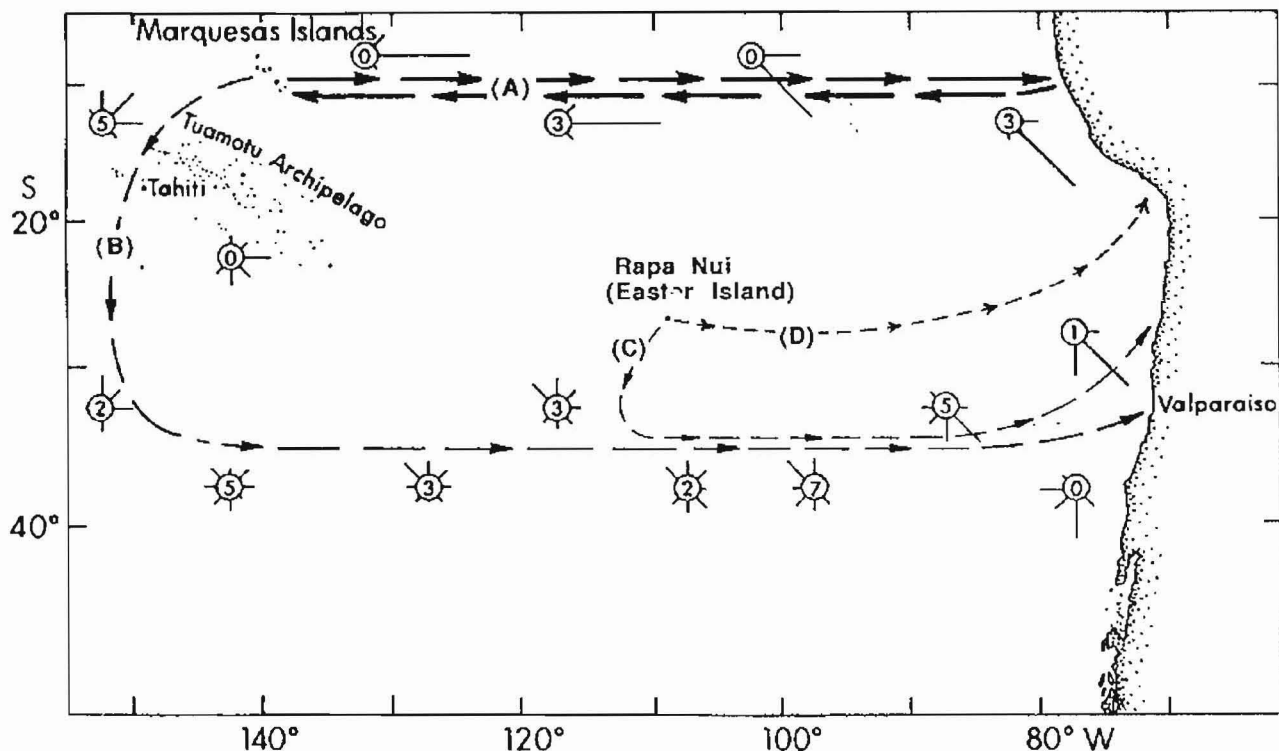


Figure 1. Some routes between Polynesia and South America. A: Peter Buck's direct canoe route from the Marquesas and return; B: the recommended square-rigger route from the Marquesas to Valparaiso; C: a high latitude westerlies canoe route from Rapa Nui to the coast; D: a winter westerlies canoe route directly from Rapa Nui to the coast (Finney In Press).

been able to work their way to South America by another way: exploiting spells of westerlies that occur episodically during the winter along the southern fringe of Polynesia. When low pressures systems that normally pass well to the south of the trade wind belt are displaced to the north, troughs extending northward from these lows cut through the trade wind field, bringing brief spells of westerly winds in their wake. In 1986 *Hokule'a* was sailed from Samoa to Tahiti, directly against the direction of the prevailing trade wind flow, by exploiting a succession of such episodes of winter westerlies (Finney et al. 1989).

Just as these winter westerlies may have been used by voyagers who reached Rapa Nui, so might others have employed them to sail from the Southern Cooks, Australs, or Mangareva to South America. Alternately, eastbound explorers may have pushed off from Rapa Nui with a much greater prospect of exploiting these westerlies all the way to continental shores, since the gap between Polynesia and South America is narrowest at this point (Figure 1, route D).

Gill (1994:17) has proposed still another way to sail to South America: by exploiting the eastward flow of the Equatorial Countercurrent. A few hundred miles north of the equator, generally in the same latitudes as the doldrum belt between the southeast and northeast trade wind systems, the current frequently reverses direction and flows eastward, counter to the westward current flow that generally accompanies the trades. On each of the eight crossings *Hokule'a* has made between Hawai'i and Tahiti the canoe's course has bulged slightly to the east as she crossed from one

trade wind zone to another, making us wonder about the possibility of using this counter current flow to work our way to South America. Some sixty years ago, the French adventurer Eric de Bisschop had also become intrigued with the possibility that the ancestors of the Polynesian had exploited this Equatorial Countercurrent, only he saw it as the key to understanding how they had managed to sail, against the trade winds, from Southeast Asia to Polynesia. He was living in China at the time, and decided to try to use this current to work a junk all the way to Polynesia to confirm his theory. Unfortunately, De Bisschop discovered what oceanographers have since confirmed: there is no monolithic counter current, just a narrow band where jets of current flow fitfully to the east. After struggling for months to gain easting, he cut his attempt short and headed north for the Marshall Islands of Micronesia--only to be arrested by the suspicious Japanese occupiers of the islands (De Bisschop 1939:5-6).

A few years after I read about De Bisschop's attempt I talked with oceanographers at the Scripps Institute of Oceanography about the possibility that Polynesians might have been able to drift to South America with this current, or the even weaker and more sporadic South Pacific Countercurrent sometimes reported at around 10-11° south of the equator. Given the fickleness of these current flow, they were dubious. However, one suggested that it might be possible to get to South America by using the Equatorial Undercurrent (Cromwell Current), a thin, narrow current that flows eastward at a brisk 2-3 knots and has been traced

all the way from New Guinea to Ecuador, but which is located some 50 fathoms below the surface. His suggestion led to some enthusiastic speculations about constructing a drogue that could be lowered from a canoe to catch the current and ride it all the way to Ecuador, tempered, of course, by the realization that using drogues to catch rides on undersea currents might have been one maritime art the Polynesians had not mastered.

Nonetheless, even without invoking the undercurrent, it might be wise to follow the dictum "never say never." All kinds of ocean voyages have been made over the world's oceans with a wide variety of craft. Perhaps some particularly tenacious Polynesian explorers did stumble across the Equatorial Countercurrent, and by design or accident followed it all the way to the western coast of the Americas. If so, however, they would have had to have carried a good supply of food and water, and/or have been expert at fishing and wringing every drop of water from passing showers, in order to survive the many months such a voyage might have taken.

One further note: Gill proposes that after his hypothetical voyagers had sojourned along the South American coast they headed back for East Polynesia, "but were swept into the Humboldt current and eventually arrived on Easter Island." It is my impression, however, that the Humboldt current (Peru Current) flows north along the South American coast, and thus would deflect westbound voyagers to the north, not the south. For example, neither the track of the *Kon-Tiki*, nor those of the dozen or so raft expeditions that have followed Heyerdahl's, were pushed toward Rapa Nui. They were either deflected slightly to the north, or, in the case of three of them, pushed so far to the north that they never made it as far as Polynesia (Heyerdahl 1978:42-43). Furthermore, in their computer simulation study of Polynesian settlement, Levison, Ward, and Webb (1973:46-47) point out that they could not

simulate pure drift voyages from South America to Polynesia as the Humboldt current always swept their simulated vessels to the north, not to the west. They therefore concluded that sailors trying to reach Polynesia from South America would have had to intentionally sail across the Humboldt current until, some three or four hundred miles out, they picked up the trades and accompanying currents flowing to the west. My guess is that any Polynesian canoe voyagers who had sojourned in the coastal waters of what is now Ecuador and Peru would have become well acquainted with the northward flow of the Humboldt current, and would have compensated for it if and when they attempted to sail back home to the Marquesas or nearby central East Polynesian islands.

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